

In the claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (currently amended) A method for identifying protein backbone configurations which are novel in the spatial arrangement and/or connectivity of their secondary structural elements comprising the steps of:

- (a) specifying a fixed set of amino acid secondary structural elements;
- (b) generating a set of stacks comprising said secondary structural elements;
- (c) evaluating designability of each stack within said set of stacks;
- (d) identifying a set of stacks, ~~based on their evaluated designability, that are~~ of high designability and that have no known counterparts; and
- (e) representing backbone configurations comprising the identified stacks.

2. (original) The method of claim 1, wherein said secondary structural elements comprise at least one alpha helix, at least one beta strand or both.

3. (original) The method of claim 1, wherein one secondary structural element corresponds to an alpha helix.

4. (previously presented) The method of claim 1, wherein one secondary structural element corresponds to a beta strand.

5. (previously presented) The method of claim 1, wherein said fixed set contains one to twenty secondary structural elements.

6. (previously presented) The method of claim 5, wherein said fixed set contains four secondary structural elements.

7. (original) The method of claim 2, wherein said alpha helix is about 15 amino acids in length.

8. (original) The method of claim 1, wherein a center of mass and an Euler angle are randomly selected for each element of said stack.

9. (currently amended) The method of claim 1, wherein implementing step (b) includes generating an initial stack by a conjugate gradient method.

10. (original) The method of claim 9, wherein the conjugate gradient method includes a step of determining the minimum packing energy of said stack.

11. (original) The method of claim 9, further including a step of generating additional stacks by performing one or more symmetry operations.

12. (original) The method of claim 11, wherein said symmetry operations comprise slide operations or screw operations.

13. (currently amended) The method of claim 1, wherein step (b) further includes ~~applying a predetermined constraint and confirming that each said stack of the set does not exceed said~~ analyzing each stack of the generated set to determine which satisfy a predetermined constraint and ~~wherein a~~ discarding any stack that ~~exceeds~~ does not satisfy said predetermined constraint ~~is discarded~~.

14. (currently amended) The method of claim 13, wherein said predetermined constraint is ~~an~~ a maximum end-to-end distance between connected ~~helices~~ secondary structural elements.

15. (original) The method of claim 1, wherein step (b) further includes a step of determining the surface exposure of each amino acid within each stack to water.

16. (currently amended) The method of claim 9, ~~wherein 1, which further comprises the step of generating a plurality of stacks are generated, wherein each stack is based on using a~~ distinct set of randomly selected starting coordinates as the starting point.

17. (original) The method of claim 16, wherein said randomly selected starting coordinates include a center of mass and Euler angles for each element of said stack.

18. (currently amended) The method of claim 9, ~~wherein further including 16, which~~ further includes a step of assessing the completeness of said plurality of generated stacks.

19. (currently amended) The method of claim 18, wherein said plurality of generated stacks is complete when about 90% to about 95% of newly generated stacks lie within a root-mean-square distance of about 1.5 Angstroms of at least one stack already in the set.

20. (original) The method of claim 1, further comprising a step of grouping said set of stacks generated in step (b) into clusters.

21. (currently amended) The method of claim 19 ~~20~~, wherein said clustered stacks are sorted and listed according to total surface exposure to water from the most compact stack to the least compact stack.

22. (currently amended) The method of claim 21, ~~wherein which further comprises eliminating from said cluster all stacks that are within 1.5 Angstroms crms (coordinate root mean square) of said most compact stack are eliminated from said cluster and wherein said process is repeated repeating said elimination process for a next most compact stack on said list until reaching the end of said list is reached.~~

23. (currently amended) The method of claim 1, wherein step (c) further includes generating a random set of amino acid sequences ~~is generated based on binary sequences~~

consisting of Hydrophobic (H) and Polar (P) amino acids wherein a random sequence of amino acids has a length of  $2^n$  wherein n is 1 to 500.

24. (currently amended) The method of claim 23, ~~wherein each amino acid 1, wherein~~ step c) further includes the reduction of each amino acid sequence of the generated stacks is ~~reduced~~ to the hydrophobicities of its individual amino acids.

25. (original) The method of claim 21, wherein each amino acid in each stack has a surface exposure value.

26. (canceled)

27. (canceled)

28. (currently amended) The method of claim 1, ~~wherein a~~ which further comprises identifying a stack as highly designable ~~stack is identified~~ when the number of amino acid sequences with said stack as the lowest energy state[[.]] is larger than the average number of sequences per stack.